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VOL. XVII FEBRUARY, 1930 No. 2

EDITORIAL

A PRESENT URGENT NEED—GET OUT OF THE RUTS

"We have always had war, therefore we will continue to have war." This expresses the kind of logic that is characteristic of a large number of people; when they think of war, they think in terms of the past, their mind moves along the ruts made by the experience of the past. They do not think of the possibility of getting out of the ruts into better ways of life and of doing things. Because of this kind of thinking, those who would help us out of the ruts find they have a very difficult job, and so the thing that the world needs and *everybody wants* (except the few who profit by war) comes very slowly, because our habit of thinking keeps us in the old ruts. Change is the order of the day—and change means get out of the ruts. This change must start with our habit of thinking.

I would say that one of the very necessary qualifications of an electroplater is that he shall be able very frequently to change his mind, to change his method of thinking in terms of the past—to thinking in terms of the future. If we change our thinking, we will change our method of doing things. We spend too much time in trying to remember how things were done yesterday, when we should be thinking of how we will do things tomorrow. It is so easy to feel that we have perfected a plating method, process or solution, but the moment we feel we have perfected something, that moment we set up a barrier toward change, and if we do not change we stay in the old ruts. Of course, there are some good ruts in

which to travel, if we don't stay in the good ruts we may go into the ditch, but we should always be on the lookout for better ways of doing things. After all, the men that make a real contribution to their special field of endeavor are the men who are remembered, because they got out of the ruts of the beaten path and became trail builders that lead to new and better ways of doing things. May every member of the A. E. S. stay in the good old ruts as long as they are good and get out of them just as soon as study and research point us to a better way of doing things.

A WARNING

W. M. Phillips of Detroit Branch

The plating industry, in spite of the many vicissitudes through which it has passed, has become quite an important factor in the automobile industry, to say nothing of its place in other lines of business. It appears to have reached a very critical phase. It can go forward rapidly, or backward with still greater speed.

The practice of plating automobile parts is being challenged by the proposed use of stainless steel and irons. Also by the use of paint, lacquers and enamels.

Sketching a few fundamentals we will ask a question: "Why electro-plate?" First: we wish to protect the base metal from corrosion and wear, allowing the engineer the choice of metals best suited to the part as to strength, workability and cost. Second: we wish to produce artistic and pleasing effects.

There is not very much question about plating producing the pleasing effects which it is asked to do. There is some question about the present type of plating being able to protect against corrosion and wear in a satisfactory manner. I do not believe that any of us could successfully plead ignorance as to how good a job should be done.

I am going to risk going over some ground which has been covered probably much better than I am able to do. Let us look into some of the causes of poor work and see what would remedy the situation. Iron and steel present a great many advantages from the standpoint of engineering. In most cases where it is used for decorative parts, a good plate is one of the essentials. One difficulty is that these parts are often made from inferior iron and steel in such a way that they are porous

or full of slag inclusions. Next, they are made in such a shape that they are difficult or impossible to polish, plate and buff satisfactorily. A great deal can be done by giving our engineers information which is necessary to remedy these conditions.

Even if the steel and iron were relatively perfect, the plate is still unsatisfactory as it is usually done.

In spite of the fact that Dr. Blum, Professor E. M. Baker and others have pointed out that a thousandth of combined nickel and copper are necessary to produce a good job, very little of the work done today carries a plate as heavy as this. In many cases it is not half as heavy.

It would appear that a great many manufacturers are leaning too heavily on the qualities producible by the light chrome coating which we put over copper and nickel plated steel.

When it comes to chromium plating, even this is seriously slighted. It has been found by our experiments that an article plated for 30 seconds in the usual chromium bath at 200 amperes per square foot is quite unsatisfactory. When it comes to withstanding even a casual polishing, 15 seconds rubbing with ordinary nickel polish will generally cut through a plate of this character. Now the average new car buyer at least is going to rub his chromium whether it needs it or not, and he may rub it off, if it only has 30 seconds on there. If we plate the article for one minute at the same current density, it is still unsatisfactory, as this plate can be generally rubbed through in one minute, whereas if it is plated for two minutes at 200 amperes per square foot or 400 ampere minutes, it generally requires about fifteen minutes, and often more to remove this plate, rubbing vigorously with nickel polish.

The question naturally occurs, "Why stop at 400 ampere minutes?" I am going to refer to a paper of Mr. E. M. Baker and Mr. Walter Pinner, read before the Society of Automotive Engineers, March, 1928, which answers this question, and also throws considerable light on the requirements of a good nickel chrome job.

Slide No. 1. Let us first refer to Fig. 2. Here we see a series of micrographs of pieces first nickel plated, then chromium plated with various amounts of chromium. The first specimen 100 ampere minutes, the next 200 ampere minutes, on up to 1400 ampere minutes on the last one. Following the chromium plate,

each piece was plated with copper from an acid copper bath. The copper does not plate on the parts completely not covered with chromium so that Mr. Baker obtained a very good map on each specimen. The black line at the bottom represents merely the edge of the specimen. The copper shows up white and the chromium black. Please notice that 100 and 200 ampere minutes do not cover very well, the chromium is quite porous. Then as we proceed, the 500 ampere minute plate starts to develop a lot of fine cracks which get worse as we go on, indicating the reason why we do not want more than 400 ampere minutes, unless other methods are shown to deposit chromium of different characteristics.

Slide No. 2. We shall now refer to Table No. 2, Series Nos. VII and VIII, representing a series of panels all of which were plated with nickel 100 ampere minutes, copper 100 ampere minutes and nickel 300 ampere minutes.

No. VIII represents a series of panels chromium plated with various amounts of chromium which had first been plated with a base deposit of nickel 200 ampere minutes, copper 300 ampere minutes, nickel 400 ampere minutes. The column of figures to the extreme left represents the number of ampere minutes of chromium used in each case. The figures given under VII and VIII represent salt spray hours. You will note that they increase gradually and decrease the same way, with a few exceptions which I believe could probably be called experimental errors. The optimum condition seems to occur at somewhere around 400 ampere minutes. This is a very fortunate circumstance as it gives us the opportunity to standardize on about this amount of chromium. Mr. Strausser has kindly given me permission to use some slides which he used in a paper entitled "Chromium Plating, Friend or Foe."

The first slide (Slide No. 3) represents a wire chromium plated to a thickness of .0019 and shows what might be considered a very nice distribution and plate of this material.

Slide No. 4. This slide shows a badly rusted and pitted piece of work which was exposed for one year in actual service. This piece was copper plated only before chromium.

Slide No. 5. This slide shows also a defectively plated filler cap taken from service. In this case the copper nickel base was too light.

In summing up, it would appear that the cause of electro-plating

is by no means hopeless. However, it is going to be necessary to do a better job. The use of stainless steel and iron has increased over 500% in the automobile industry since last year. In some cases it is absolutely the right thing to use, and I don't believe that any plated work can compete with it for these uses. Among these are wire wheels, another is running board molding. In these cases, electro-plating through too severe usage is removed, either by abrasion from stones striking the wire wheels, or from scuffing in getting in and out of the car on running board moldings.

There are many other cases where steel articles plated with copper, nickel and chromium would be much more economical if the work is done properly, but I believe you will agree with me that a warning at this stage of the game is in order.

I have mentioned one other thing there—I said that paint and enamel were a certain amount of threat to the plating industry. We have practically done away with plating on automobile rims and are using Parkerizing and enamelling. That was due to two causes, the main one that we wanted a black rim due to the black side walls on the tires, more than the fact that the plating was not satisfactory. The plating was really quite satisfactory, but we needed a black and couldn't very well plate it black as economically as we could do it the other way. But there are certain improvements in the paint and lacquer industry that call for a better plate so as to have a uniform finished product, that is a product that will stand up the same all the way through. And I am going to ask everybody to try and co-operate to get a better standard of plating.

CHAIRMAN FEELEY: Are there any questions the members would like to put to Mr. Phillips?

MR. WOODMANSEE: I would like to ask Mr. Phillips if his company will pay the price to get that product the way it should be.

MR. PHILLIPS: I would say yes, Mr. Woodmansee, that that will be done. The very fact that companies—not ours, but others—seem to be willing to pay for stainless steel is the answer.

MR. HOGABOOM: It would be fine if a company such as Mr. Phillips represents would develop a standard method or standard process for testing. His figures on salt spray mean nothing—it just means what he got in that particular line. It depended in a large measure upon the degree at which the salt

solution was atomized. If he had a fine spray, he would get one result; if a coarse spray, he would get another result. If the air leaked out of his chamber at a different rate, he would get a different rate of corrosion. If he would, as they have done in the Bell Telephone laboratories, exhaust the salt spray chamber, he would get one-fourth the life and corrosion as he would if he didn't exhaust it and kept it tight. So that salt spray, as is, and the figures, are only of the value to a particular test, under particular conditions, and unfortunately, the investigators do not give those conditions, so comparable results can be had throughout the industry.

MR. PHILLIPS: I think Mr. Hogaboom is 100% correct about the salt spray being merely a comparative test under the conditions under which it was conducted; that is, I do think Mr. Baker's figures have value, a value by comparison in that particular test. Probably all his factors in that case were fairly uniform. There is one thing else, however, before we condemn the salt spray too harshly. The material which we ordinarily take as an example to electro-plate quite often has variations in it greater than the salt spray; that is, we may select ten pieces of steel, ten articles, and of those ten articles, the basic material is going to vary all over the lot, probably. We will have a lot of holes in one, another one pretty good, and if we were to put the faintest kind of a plate on that and merely test it, there would be a big difference right there. So we are applying a rough, a very rough and inaccurate test when applying the salt spray, and do need a better one, but we will need it a whole lot more when the raw materials become more uniform.

MR. SIEVERING: I would like to know if the automotive industry is making any standards at all as to what constitutes a standard plate.

MR. PHILLIPS: I can only speak for the company that I represent. We have recently adopted a specification calling for a definite thickness of plate, in addition to the salt spray, and I may say probably in the future, judging work, we will pay a little more attention to the thickness of the plate than we will to the salt spray results.

DR. BLUM: I want to come up and speak in front here because what Mr. Phillips and Mr. Hogaboom said fits in so well with the program of the Research Committee for the next year that I am going to risk a repetition of some of the things that

were said last night when only the stragglers were left here and after our own technical program.

As some of you know, at the meeting of the Research Conference held in Newark on April 6, Mr. McCord, of this city, gave a rather scathing indictment of the plating on automobiles. I am not going to discuss the question as to what extent this criticism was justified, but at any rate, the two points that he emphasized were first of all that we do not know what constitutes a good job of chromium plating, and a means of defining and ascertaining it; and secondly, the manufacturers are not using the knowledge that they already possess. Now, the Research Committee certainly, or the Bureau of Standards, can have very little to do with the latter part, that is, the question of the selection of the conditions by the manufacturers is an economic question which they are going to be forced to just to the extent that the public demands it. But the Research Committee did decide that the subject for research for the two associates for the next year, or as long as necessary, is to be the protective value of plated coatings, with special reference to chromium. No we have not attempted to make a detailed plan of the investigation because there are so many factors that will have to be planned in the light of what we discovered in the early work; but we are starting out to work on the question of the porosity of the coatings, and then, in the light of that, the relation between porosity and the protective value, both under accelerated conditions, including salt spray and any better test that can be devised, and under normal atmospheric conditions, in different localities, we hope, in co-operation with the American Society for Testing Materials, who maintain test fences at five different localities in this country.

Now the reason that I am speaking emphatically on this point is because of the conditions which Mr. Phillips and Mr. Hogaboom and Mr. McCord and others have pointed out, that this whole subject is of very grave importance to the electro-plating industry. It isn't a question simply of how you are going to do your plating, it is a question of whether you are going to do your plating. In other words, as to whether nickel and chromium plating will increase in extent or decrease in extent.

Now all of this means money to support the reasearch work and the Research Committee. The research work, the research fund, is just completing its first three-year program, and during the next six months, it is going to be necessary for the Re-

search Committee to go out to the manufacturers, not simply to collect the funds they have promised—they have already paid that but to get new promises for we will say another three-year period, in order to support the work of the research associated and in order to get more definite information.

It is no disparagement of Professor Baker, who was unable to come to this meeting today—it is no disparagement to say that as valuable as his results are, they are not the last word; there is still a great deal more to be learned regarding the relation of various factors to the quality of the plating, and I say that then, when the Research Committee comes out for funds, don't forget that it is your committee and that it is the fund of the Electro-Platers' Society and that the Research Committee can not get those subscriptions and those funds unless the members of the branches get back and help.

It is very appropriate that Mr. Phillips and many others here represent the automobile industry; certainly the biggest branch of plating in the country today. And I say with no disparagement to them at all that out of over 100 subscribers to the Research Fund during the past three years, there is one automobile concern represented, Mr. Phillips' firm, and there are four accessory firms. Now you know better than I do how many automobile factories and how many accessory firms there are in the country, and I just say that every firm that is interested in plating, if they feel that the research work should be carried on, (and that is for you people to decide, if you feel that the research work should be carried on and extended along these lines that Mr. Phillips has suggested), then get back of your Research Committee.

I am not speaking for the Bureau of Standards, I am speaking for the Society and for the Research Committee, because I know how hard they have worked during the last three years to collect and administer the funds that were used in the research work. We are simply your agents, we are at the Bureau. Our laboratories are at your disposal, and we will do just as much work as we can, both with the funds obtained from the government and with the additional funds that are secured from those who are interested in electro-plating. But I have made this talk today even though it is more appropriate tomorrow, in connection with the business session, because I see there is a big crowd here today, and I don't know whether there will be so big a crowd tomorrow.

MR. HOGABOOM: Mr. Phillips spoke about the replacement of the present iron and steel with stainless metals. Will the same thing occur with aluminum, chromium plated?

MR. PHILLIPS: That is a very difficult question, for this reason. I wouldn't say that chromium plated aluminum is a failure, but it is not yet as satisfactory as we would like to have it. If it became more satisfactory, then it would become a possible contender for a place in the industry. But it does need to become a little more satisfactory than it is at the present time.

CHAIRMAN FEELEY: Are there any more questions? This is very important to the industry and to every plater. I might draw your attention to a suggestion made to you by Mr. Phillips. He says it is in the hands of the plater to present his position to the automobile manufacturer in the construction of his supplies, radiator shells, and so forth, that they get away from the recesses and the difficulties that we have in getting into, both for polishing and to throw. It is possibly well that the American Electroplaters, in session, might take this up at their business meeting tomorrow and make some recommendation, that a great deal of the difficulty found in industry, as Mr. Phillips said, the cutting through the edges and the difficulty of throwing into the designs as constructed now by the automotive engineers, might be avoided.

MR. LOUIS LICHTMAN: You do not think, Mr. Phillips, it is more advisable before you decide upon the thickness of plating that you also decide upon the porosity of the plate? Has that a material effect on the lasting qualities of the plate?

MR. PHILLIPS: Certainly, if a last coating of non-porous metal could be put on, it would be an aid. However, we find that most of the plates are porous, and we must treat things as they are, not as we would like to have them. When, later on, someone comes out with a plate that is absolutely non-porous, we can cut down the thickness with impunity.

THE PAST AND PRESENT OF ELECTRO-PLATING

Read at 18th Annual Meeting of Chicago Branch, A. E. S.

By Jos. H. Hansjosten

Mr. Chairman and Gentlemen:

When your chairman invited me to address you on this auspicious occasion, I felt that a great honor had been bestowed on me and when he requested that I speak on "The Past and Present of Electric-Plating" I knew I was on safe ground. So I wrote to him, and told him that I knew of no one better qualified than myself to speak on that subject; particularly, the "past of electro-plating," for I informed him, I could go so far back in plating, that to tell it would sound like ancient history.

His request sent my memory racing back over the years gone by, back to scenes and conditions as they were then, scenes almost forgotten, and conditions that would not be tolerated today. In comparing that time to the present, I was impressed with the changes that have taken place with the changing years—changes for the better.

We know that the world has improved, or rather that conditions in it have changed, not only in our industry but generally. We are no doubt more impressed with the changes in the plating industry, because we are in daily contact with it. But, even out of our line of work the world did move, and move forward fast. So notable are the improvements that by contrast, they are striking.

Strange how some happenings awaken long dormant memories in us, and stir our ever-present tendency to look backward. And looking backward I know some of you will go back with me in memory, and view again scenes long forgotton and see again with memory's eye, some face long since dim. Many of you here today can look back to the time when a plating room was considered just a necessary evil, just an added expense to a factory, and the time when the public taste was not developed to look for beauty as well as for utility.

You may think, as I go on that I am rather hard on the old-time plating room and that I exaggerate. But, the truth is, my pen has not the facility to describe the conditions as they really were.

Some of you know that the picture is accurate, for you saw it. Others of you who came into being at a later and more enlightened time, will be grateful that the voice of those "crying in the wilderness of long ago" was heard and that they prepared the way for you, and made your path if not easy, at least less hard.

Let me first impress on you that to the old-time plater the mixing of solutions was a secret to be jealously guarded. It was his firm belief that the beginning and the end of the plater's art was the mixing of solutions. He who knew how to mix a nickel, copper or brass solution was a plater; and the logical sequence of such a belief was that for his own protection he must guard his secret well. You would not think of erasing the names of chemicals from their containers today, yet many of us saw that done frequently; for if the plater was to fully guard his secret no one in the room must know what he put in his solutions.

I can shut my eyes and still see an old-time plating room presided over by a kindly old man, who had a partition built across one end of the room so that he could keep his work from spying eyes. In the little room so made he kept his chemicals and mixed his solutions. In the partition were windows and on the windows were curtains which were drawn together whenever he went into his sanctum to mix his solutions. He would bring his mixtures from his little room in a large copper dipper and pour them into the tanks. In that particular plating room we used only one kind of acid and that was brought out of the little room in an earthen pitcher whenever it was needed. It was muriatic acid, but I did not know that until some years later. Besides the nickel solutions, we had in that plating plant, a copper solution that sometimes plated copper, and a brass solution that never plated brass.

I can vividly remember another plating room which had windows on one side—not many!—but they were windows. Against one of the windows was the "strip tank," a large earthenware crock, where future platers stripped the nickel from the copper wires on which the work had been hung in the tanks, so the wires could be used again. I might add, for your information, that we took the kinks out of the wires by striking them on a flat piece of iron and then sorted them as to lengths. How often we used them I do not remember, but labor was cheap then and I assume it paid to save them. The strip just mentioned was of the nitric and sulphuric acid variety and when the wind was in the right direction

and the strip was working good, you knew without being told that the breeze coming through that window was not scented with the breath of new-mown hay.

The plater in that plant had a little "stock room" in one corner of the plating room, which we irreverently called the "Holy of Holies" and which was always locked. In it he kept his chemicals and mixed his solutions, and it was the only part of the plant where the floor was dry. In the rest of the room we just waded from tank to tank. Rubber boots were too high in price and wooden shoes were not high enough to keep our pedal extremities dry, for the water was always at high tide. But it was a rather nice place to work in. That is by comparison.

As I stated some time ago the knowledge of mixing solutions was the plater's secret. It may even be called a dark secret when the work turned out by some of them is considered. His attitude toward his fellow platers was the same as toward his helpers. He would not in those days exchange ideas with another plater because he might possibly have a better solution than the other fellow and he did not want to give his formula away. So he hid his light under a bushel. The trouble was, in cases at least, that when the bushel was raised there was usually no light under it. As a rule when two or more happened to meet they could not or would not agree on anything. It was not policy to agree, for each might give some of his secret away.

But there came a day when they received a great shock and many of them finally had a subject on which they thoroughly agreed. A book was written and published which exposed their most cherished secrets and told how their solutions were made. Anyone who bought it and read it could now know the plater's secrets. My memory is rather dim about this but I believe that some of them agreed so thoroughly on this subject, that they requested the supply houses to refrain from selling the book. It was to them the most outrageous thing that had ever happened. Why even the boss would now be able to mix solutions and every Tom, Dick and Harry would now be a plater.

Those were indeed dark days for the old-timer. But even then the dawn of a new day was breaking—a new era in the plating industry was at hand.

In describing the last plating room I said it had windows in one side. Now I will tell of one that had windows in the sidewalk.

Ridiculous, you say? Not at all. For, bear in mind, that we are still speaking of the days when any old place was considered good enough for the plating room. This room was in the basement and the plating tanks were in that section that extended under the sidewalk. All the daylight to be had came through those thick, round pieces of glass set in the iron framework of the sidewalk above. Some of the glass was always missing, but we had on hand a number of pans to catch the water that came through when it rained.

The connecting rods in this plant were very handy. We had no rheostats, but we had a lot of copper wire twisted into a cable that was fastened to the bus bar, and we just slipped the other end of it around the cathode rod when the tank was loaded.

The dynamo was a wonderful piece of machinery. As an antique it was grand! But it could be regulated quite handily. In the front part of it were a number of holes and in a box we had a number of what we called plugs. To step up the current we put a plug in one of the holes. The more plugs we put in the greater the shower of sparks became when we drew a file across the anode and cathode rods.

Of course, some plating rooms were more up to date. I saw one that had electric light bulbs connected to the tank rods. If the lights were bright, the dynamo was doing its bit. If they were dim a piece of sandpaper held on the commutator or some belt dressing applied to the belt usually helped.

Among the platers of that day were many men who realized that if they were to become masters of their art they must know the scientific principles upon which it rests. And more and more the progressive plater studied the why and wherefore of electrodeposition. Instead of looking for new formulas he began to study—he tried to find why a solution acted thus and so. The rule of thumb was slowly but surely giving way to scientific practice.

And here, too, let me say, among them were men who did splendid work; while they were not confronted with modern mass production, neither did they have modern instruments to help them overcome their difficulties. The hydrometer and a piece of litmus paper were his only means of making a test. Compare that with our color meter for the testing of acidity and metallic content, and your simple titration for your chloride test. That will give

you an idea of the difference in the methods then and now. It is a matter of wonder that they were able to do as good work as they did.

Among the factors that aided much in bringing light into the darkness were the representatives of supply houses and the trade journals.

There were a never failing source of information and they contributed generously to the solution of many problems that confronted us. This tribute is due them from many of us for few platers of that time did not at some time receive their aid.

It was the progressive plater, the man with vision and a desire to elevate himself, who saw that if the art of plating was to become what it should be and what it has since become, he must cease to isolate himself and exchange the knowledge he possessed with his fellow plater. Both of them would gain in knowledge and both of them would be better platers. How could it be otherwise? When each of them knew how to do one thing and they exchanged that knowledge both of them knew how to do two things. Gradually, as the dawn grew into day, more of them got together and laid the foundations on which this great society is built.

And they built better than they knew. I venture to say that our esteemed founder, who today is honoring us with his presence, never in his most optimistic moments or in the greatest flights of his fancy fully visioned the growth in influence and members of this society of today. For our *society,* more than any other *factor,* is responsible for the great improvement in methods, equipment, and general conditions in the modern plating plant. For today, instead of the old earthen crock by the window, the strip tank is covered with a hood and its poisonous fumes are mechanically carried away. The contaminated air of the old room is no longer in evidence, and with it is gone the sallow skin and the cough that it usually brought about.

The rule of thunb is replaced by the rule of science and the plater that did not realize that a new era was at hand has become as driftwood cast on the shore of the stream of progress.

And the journey's end is not yet. There is a long, long trail ahead. A condition confronts us today that for ourselves and our employees we must prepare to meet. For today as never before we face a competition,—the "New Competition" as it has been called. A competition so keen that the like has never been. I do

not mean a competition among ourselves,—though to an extent it is even that,—but the competition for business brought on by modern mass production, the production for which the sales department must find a market if wages and dividends are to be paid. The plating cost of a product is only a part and sometimes only a small part of the cost of a product. But, whether much or little the plater who can keep his cost at the minimum is the one who will do his share in helping his concern to meet the new competition.

Today, and in the future, it behooves the plater to pay quite as much attention to the elimination of waste, waste of time and material, in his departments as to the chemistry of his plating. Holding your cost to the lowest point can be done by applying scientific principles to your work. It can not be done by lowering wages, for a concern to be successful must have successful workmen, and an underpaid workman is not a successful workman. It must be done by instilling a spirit of co-operation and loyalty in our workmen by letting him realize that unless profits are made wages can not be paid. That unless the firm that employs him can meet its competitors on an equal basis for the world's business, their business and his business will cease to exist and as a natural sequence dividends and wages will stop. Truly the employer today is not lying on a bed of roses, and if he were, the thorns of competition would prevent him from enjoying sweet repose.

You recall, how years ago we insisted that plating was a science, a fact now generally conceded. I will say now that we will need every bit of knowledge that we acquired during the years, including the science of handling men as well as scientifically handling our departments to meet the competition of the immediate future.

And we will be forced to acquire more knowledge, we will have to find a way to handle stainless steel. As though the new competition were not enough and did not give us problems enough to solve we will find this a hard one to solve, and we will find that this problem is with us even now.

But life is like that—just one thing after another. And like men, men worthy to be members of this society we will meet every problem of the future and solve it; meet the new competition and beat it,—in short, *we will win.*

DR. LUKENS: It gives me great pleasure to introduce Dr. Edward B. Sanigar, the holder of the research fellowship with which you are all familiar, and now studying and working on research at Columbia University.

DR. EDWARD B. SANIGAR: Mr. Chairman and Gentlemen—The first two speakers began by saying you had a very ambitious program, and to judge by the typewritten sheet which you all have, that is true, so I don't want to take up too much of your time in saying anything by way of a speech. Besides that, in looking around the room, I recognize so many people that I dare to call friends that it is like being introduced a second time. But I should like to say thank you very much for inviting me here, and the more I see of the American Electro-Platers' Society, the more I think you are a jolly good concern and you contain some very nice people.

The treatment I have had in America since I landed, which was only on September 9, has been, well, no less than magnificent, and that treatment has been mainly at the hands of your own members. I want to thank those members, and you, as a Society, for that treatment, and for inviting me here this afternoon.

While I was in England, I did research work on silver plating. Of course, although both countries, America and England, speak the same language, there are lots of differences of opinion, and lots of mistaken ideas in one country about the other. To give you an example, one of my chief problems was to try to prove to the Sheffield platers (and after all, Sheffield is the home of silver plating, and most of the silver plating in England is done in Sheffield)—I tried to prove to them that sodium cyanide was as good as potassium cyanide. I can see Mr. Mesle smiling already, because what happened was this: I spent about three years on it, and I thought I had proved to them that one was as good as the other, but they couldn't see it, and then I got a chance of coming over to America and I thought, "Well, I am coming to the place where they do believe in sodium cyanide." I hadn't been here very long before Mr. Hogaboom came along and said, "Well, we don't know whether you know much about silver plating, but we are going to take you and show you how it is done."

So he took me along to the United Community Works, and there I met Mr. Mesle and asked him why he was using sodium cyanide? He turned around and said, "We are not. Potassium cyanide is much better." And so here I am now, just where I left off.

So exactly what we are going to make of it, I don't know, whether it is going to be sodium cyanide or whether it is going to be potassium cyanide. However, that is not the question to be debated at the moment, so without hindering you further and keeping you further from the speakers, I say thank you once again.

PHILADELPHIA ANNUAL BANQUET, NOVEMBER, 1929

DR. LUKENS: It gives me great pleasure to introduce Dr. Blum, who will speak to us upon the subject of "Throwing Power in Chromium Plating."

DR. WM. BLUM: When I looked over the program today and saw this was the only paper on chromium plating, I felt a great responsibility rested upon me, because during the last two years there has been almost nothing else except chromium plating discussed at these meetings of the branch. Referred to Farber's report, printed in Dec., 1929, Review.

CHAIRMAN LUKENS: Dr. Blum has already mentioned the widespread interest in chromium plating today. I have no doubt there are many potential questions waiting to be asked.

MR. MACSTOKER: I have been requested to ask a question by the gentleman next to me, who is rather hoarse. I would like to ask Dr. Blum if he, in his opinion, thought it would be better to use a lead anode with a covering of lead peroxide, or to have one clean, as much as possible at all times free from the peroxide film?

DR. BLUM: That whole subject of the composition and the behavior of the anode, especially anodes in chromium plating, is somewhat the same as Mr. Sanigar said. When we believe that we have learned something, or that something has been definitely settled, we get something that appears to contradict it.

In the first place, it is certainly the general experience of platers that lead anodes with about 6 per cent antimony, do keep cleaner than the pure lead anodes. That is the general experience

of the platers, and certainly it is an advantage to keep the anodes clean. In other words, the voltage required in order to get a certain current density will be lower if your anodes are clean than if they are coated with anything. Now as contradicting—or I won't say contradicting, but just indicating the difficulty in deciding on that, we made up some 6 per cent antimony lead anodes for the work at the Bureau of Engraving and Printing, and then up to that time we had been using fairly thin sheet lead for anodes, about ⅛ inch thick. And so I asked Mr. Slattery to run in tanks right alongside of each other, for the same work, the antimony-lead anodes and the lead anodes of the same size, pure lead anodes. He had to get some ¼ inch lead anodes in order to get the same size and shape, so when he used quarter inch pure lead anodes he found that they kept a good deal cleaner than the thinner lead anodes, and in the six months or so that he has had these running, he has not found any appreciable difference in the coating of the pure lead anode and the antimony-lead anode when they are both the same thickness.

Now that observation was not original with us. The reason we suggested that he make them the same thickness was that someone—I believe it was Mr. Schneidewin—suggested it. It came to me indirectly, that by using thick pure lead anodes there was less corrosion of the anodes than with thin sheet anodes. Now if that is generally observed, it is probably due to the fact that lead is not a very good conductor, and when you run a high current, as you do in chromium plating, through a thin sheet of lead, it may be that that lead is a little bit hotter than the solution, and therefore you may have more coating of the lead. I simply suggest that as a possibility, and I don't feel that the question is closed.

I had the inquiry, I think this last week, whether it was better to use 2 per cent antimony or 6 per cent. Well, we are in doubt. We don't know. We know antimony is a good thing, that they work well to have the antimony in, but we are not sure whether they work any better than if it isn't there.

I might state in itself the coating of the anode or the composition doesn't affect the throwing power. We get it just the same, whether using pure lead or antimony lead anodes, or platinum or iron. But, of course, it does change the composition of the solution.

MR. JOSEPH MUIR: I have noticed in my chromium plating work, brown spots appeared through. Is that due to burning the nickel, or is some chemical reaction taking place there?

DR. BLUM: Where there are brown streaks on the chromium plating, it is sometimes due to low sulphate in the solution. Of course, it may be due to the material you are plating not being completely rinsed off after the work has been plated, but it is also true, of course, that if the nickel was not properly polished or the polish was not completely removed from the nickel that you would expect to get a rough or dull chromium.

MR. MUIR: Would it slip or peel in that case? The chromium?

DR. BLUM: If there were polishing material there, you might expect it to peel. If it just left the nickel rough, it would be less likely to peel.

MR. MUIR: The nickel coating might have been burned by the nickel composition, the nickel compound, the lye compound, used, in the buffing department.

DR. BLUM: You mean actually oxidized. I don't know if that is likely to occur, whether in buffing you are likely to turn nickel dark if it gets too hot.

MR. MacSTOKER: Might I ask Dr. Blum if he thinks the addition of carbonate soda would reduce the sulphates in chromium plating baths?

DR. BLUM: Carbonate of soda or barium?

MR. MacSTOKER: Carbonate.

DR. BLUM: Sodium carbonate or barium carbonate?

MR. MacSTOKER: Sodium.

DR. BLUM: I can see no reason why the addition of sodium carbonate to a bath would change the sulphate content, because all you do by adding sodium carbonate is to form sodium dichromate. In these experiments, we added large amounts of sodium dichromate and found no improvement in throwing power obtained to warrant its use. It made a slight improvement which was the same as if we had increased the chromic acid; but if we changed the sulphate content at the same time we got less throwing power with the sodium di-chromate there, but I can see no way in which sodium carbonate added to the solution will remove sulphate from the solution. Barium carbonate, of course, will remove sulphate from the solution.

MR. LIGGERY: We have been experimenting with chromium

plating at the Frankford Arsenal several years, and we successfully plated a 3 inch gun lining. I don't know whether in your experiments in Washington you have come across that article or not. This gun liner was twelve and one-half feet long. We had a specially built tank. I am not a chemist, but happen to have charge of the plating there, and we used lead anodes about five inches wide by two feet long, and a half inch thick, cast in our foundry with the purest lead we could get. We didn't treat it in any way except to clean them and wash them chemically clean, and we hung them on the length of this tank, which was about twenty-four feet long. We found in keeping the temperature at about 135 degrees, 100 amperes to the square foot, we got a very nice and bright piece of work. Furthermore, that plating was tested for every inch of its length, and it was found not to vary more than two ten thousandths. That sounds almost incredible, to measure it with accurate measuring instruments, and we didn't do it the first time, but we had to rig up something to revolve this work, we kept it constantly revolving. It took about six hours to do that outside plating. It had to be plated inside also, and it was very interesting. We elevated the work and put a steel anode in there, about one-third plating ratio, and introduced the solution at the bottom, raised it, and it was siphoned out of there. We didn't dare have that over two ten thousandths of an inch thick, and a plug gauge had to go the entire length of that, and it was successfully done. So that was one of our large chromium plating problems up there. The work came out very nice. The gun barrel wasn't polished, except for a fine tooling, and the usual file and emery cloth, but it wasn't buffed.

DR. BLUM: I heard some reference to that. I think it was a very interesting application of chromium plating, and shows no matter how hard the job is, it can be done if the plater has patience and ingenuity.

MR. DUNK: Can 85 per cent copper, 5 per cent zinc and 5 per cent lead and 5 per cent zinc be plated with chromium?

DR. BLUM: That is the common admiralty metal, is it not? I do not know of particular applications of chromium plating upon it, but I can see no reason in advance why great difficulty should be experienced. Because it is perfectly possible to plate chromium upon copper, to plate chromium upon brass, and I do not believe that a high copper material like this would be

especially difficult to plate. It might be necessary to use special methods to get the surface in the proper condition; perhaps someone here knows whether that can be done.

MR. HOGABOOM: Dr. Blum, the gentleman is trying to plate a casting, and evidently the segregated parts would cause trouble. It would probably be better to give it a flash coat of copper and see that he got a uniform surface that would take it.

DR. BLUM: I would say that is a very good explanation and suggestion also, because of course if a metal is not uniform and particularly if there are any foreign materials in there, chromium plating is particularly sensitive. In a good many cases a flash of copper is an advantage in order to get a uniform surface.

MR. DUNK: I was wondering since that same method is used on valves and other things and they chromium plate them—I was wondering why it couldn't be done on a windshield.

DR. BLUM: I think it is probably a condition of the metal on the surface and the uniformity of it.

MATERIAL COSTS OF FINISHING

Read at Detroit Annual Meeting A. E. S., July, 1929
C. Van Derau, 1st V.-Pres. A. E. S.

During the past score of years, there has been a vast change taking place in the field of Electro-plating. The most outstanding change being the effort of the Electro-plater to master the technical side of his profession through home study, night schools, and group study of chemistry, as fostered by a large number of our society's branches.

However, as we progress with the technical study of the basic fundamentals of plating, we find that our employers, while interested in our endeavor to better our knowledge, are even to a greater extent interested in our ability to apply our newer knowledge in the handling and training of men under us, and in our ability to line up more modern equipment to obtain a better product at a lower cost. Their opinions to a large extent are based on the overall cost of our product, and on the comparison of our finishes with what our competitors are offering to the customer.

Productive labor and department overheads are generally known to the Electro-plater, but finishing material costs are, as a rule, left up to the accounting department to allocate as they see fit, generally placing this item of expense in a separate overhead, or in a general factory overhead.

When the electro-plater is asked the question: "What difference is there in the material costs of nickel-plating and a lacquer finish?" the average electro-plater cannot give that difference for the reason that he does not know, and will refer the question to the cost department, which is, as a rule, as ignorant of the right answer as he is.

Many times an article that is being made at a profit, becomes unprofitable by simply changing the finish, due to the difference of material costs.

The purpose of this paper is to show a joint method worked out by the engineering, cost, and finishing departments at our plant to control the all important item of expense materials of plating.

For several years the accounting department carried material costs as a percentage on flat labor costs of polishing, plating, buffing, enameling, painting and lacquering. With this method in use, a percentage of 25 per cent of the flat labor covered the material costs. With the installation of automatic polishing and buffing, and the conveyorizing of the finishing departments, it was found that the 25 per cent went to 35 per cent within a year. Over a period of several years the 35 per cent went to 43 per cent to as high as 120 per cent of the flat labor in these departments.

For the above reason, it was necessary to work out a better method of accounting for this item of expense. The engineering department figured the area of all parts finished and noted this on their drawings. They also adopted this as standard practice for the future. The cost department secured the total number of parts or complete units manufactured during the year of 1927; the finishing department made up a list of all material used during the year of 1927, after which the cost department extended the costs of each item including transportation charges.

From this list the various items were segregated under their respective columns, such as nickel copper, chromium, lacquers, etc., and added together for a total material cost of the various finishes. Acids and cleaners presented a problem in allocating the proper

share to the various finishes. By taking the area of a finish and dividing by the total area of all finishes in which these cleaners were used as a part of the process, it was easy to determine what percentage belonged to each finish. This cost was added to the cost of the various finishes.

RECAP OF PLATING MATERIAL

Item	Nickel	Copper	Cadmium	Chromium	Aluminum Bronze
Regular materials	$18,312.510	$1,200.410	$1,927.830	$633.50	$ 954.38
Cleaners	6,520.061	1,811.128	543.338	181.113	.....
Cyanides	.....	4,270.175	991.485	.....	.....
Turpentine	21.578	.....	.....	.....	.....
Wax	72.400	.....	.....	.....	.....
Copal Varnish	.....	.....	.....	.....	657.78
Caustic Soda	.....	38.320	.....	.....	.....
Gasoline	.....	.....	.....	.....	172.10
Totals	$24,926.548	$7,520.033	$3,462.653	$814.613	$1,785.26

RANGE BAKING JAPANS

Items	Quantity	Cost	Total Costs
Range Enamel	4,070 Gal.	$1.10	$4,477.00
Range Touch-up	29 "	4.00	116.00
Primer Coat	62 "	2.00	124.00
Varneline	2,040.5 "	.215	438.71
Grand Total			$5,155.71

SWITCH JAPAN

Items	Quantity	Cost	Total Costs
Switch Enamel	3,087 Gal.	$ .75	$2,315.25
Switch Touch-up	103 "	3.00	309.00
Varneline	2,040.5 "	.215	438.71
Grand Total			$3,062.96

SLATE BASE LACQUER

Items	Quantity	Cost	Total Costs
Black Lacquer	355 Gal.	$2.45	$ 869.75
Rubber Finish	66 "	4.00	264.00
Lacquer Thinner	421 "	1.55	652.00
Grand Total			$1,786.30

SUMMARY OF MATERIAL COSTS OF VARIOUS FINISHES

Finishes	Cost in Dollars	Area in Sq. Ft.	Cost Per Sq. Ft.
Nickel	24,926.548	1,497,090	.01665
Copper	7,320.033	353,923	.02068+
Aluminum Bronze	1,784.260	219,396	.00813+
Bronze and Lacquer	8,816.940	308,944	.02853—
Cadmium	3,462.653	100,000	.03462
Chromium	814.613	30,822	.02640
Range Paint	5,155.71	1,765,654	.00292
Switch Paint	3,062.96	978,582	.00313
Slate Base Lacquer	1,786.30	135,126	.01320

Vitreous Enamel	1 ground coat on 2 sides	.008
" "	2 white coats on 1 side only	.020

From the above figures, it is apparent that deposits from

cyanide solutions cost more per square foot than deposits from acid solutions, due, no doubt, to the fact that all sulphate solutions are soluble in water, whereas the metal cyanides require sodium cyanide and water.

Over a period of time considerable sodium cyanide is required to maintain a workable solution. Inert salts of carbonates also increase material costs of cyanide solutions.

Lacquer enamel costs more per square foot than vitreous enamel when it is necessary to apply three and four coats to obtain a comparable finish. This, no doubt, is due to the fact that water is used as a vehicle for vitreous enamel, whereas alcohols are required as vehicles for lacquer enamel. In either case, the vehicle is evaporated into the air, and the difference in costs is the price of water as compared to the price of alcohols.

The above method of figuring material costs has been applied for the past one and one-half years, and has proven entirely satisfactory.

Now the reason for using 1927 figures was that we didn't want to give out information of that kind until we had a chance to prove up on those figures.

Now, at first, one is inclined to think that it takes a tremendous lot of work to find out what material costs are. As a matter of fact, it does take a tremendous lot of work for a few weeks on the part of some one man to gather up this data, and do the dividing and calculating that is necessary to get the right answers. In all plants the material costs will vary. For instance, the cost in our plant that is .02 per square foot may only be .015 in another, or it may be .025. Now the reason for that is that it depends on your standards and the amount of plate that you are putting on your product. The average thickness of the nickel deposit here is approximately .0005. We have a lot of parts in which we put .001. We have other parts that we only need to put on .0002 and .0003. So, taking that average of approximately .0005, these figures will cover that condition. So you can readily see that if you use those figures in your own plant that you will have to determine on just about what your average thickness of deposits was in order to find out what the approximate cost of material is.

Now that is an important thing, particularly in job shops. I spent fifteen years in job shops, doing all kinds of work, all classes, and I know of months where we had tremendous lot of

business, worked overtime, added as many people as we could hire, and yet at the end of the month, we came out just about even, and sometimes would go into red figures on our ledgers, and we wondered why. As a rule the Board of Directors of that company would get together, and being in charge of plating operations I generally got panned because we didn't make any money for that month. Now I can look back today and see that during some of those months when we didn't make money, it was due to the fact that we changed over possibly from long runs of nickel plating to lacquer coatings, and our overhead as it was set up was not large enough to take in the additional expense of lacquers as against nickel plating. The only thing that was in our favor, and is in most jobbing plants favor is that we may have a month of that run and then it turns back again and it is a darned good thing, because there would be more companies going broke, or they would have to find some means of getting this all important item of expense under control.

Now as a word of explanation as to why the change from 25% to as high as 120%. That method of accounting was all right for a period of time, as long as operations in the plant were constant. I mean by that that if we were doing hand polishing, plating in there almost any old style, but the same day after day, buffing, hand buffing, we would have approximately so much flat labor day after day or month after month, and a cost accountant could take that and proportion these expense materials in such a way that he can carry a percent. When we take an article like a toaster and take out our cost of polishing and flat labor by hand, 15¾c, and by putting in a $15,000 polishing machine we reduce that cost to .6c, where did this 25% go on changes of that kind? When we take an iron and reduce our labor cost from 25c to a little less than 10c, by automatic equipment again the 25% grows out of proportion. So that's the reason why this has been absolutely necessary in our plant to bring material costs under control, and I am only passing this along for any god thing you may get out of it, and you may find that it will show a way that can be used for figuring material costs.

CHAIRMAN FEELEY: Are there any questions anyone wishes to ask Mr. Van Derau on his paper?

MR. ROGER S. SPERRY: Mr. Van Derau states a certain price per square foot for lacquer enamels. That is probably correct on a perfectly flat sheet of material, but if he is spraying an

odd shaped piece, he is going to lose a lot of stuff because it won't hit the article. And some shapes will lose a great deal more than others. Does he consider that?

MR. VAN DERAU: Yes, that was considered. On articles such as a Cozy-Glow Heater, you have all kinds of shapes there. You have an arm that this reflector is mounted in, and you have a round base—it is all spraying, and we are subject to those losses. Now if we took a lacquer only on a reflector part, and particularly inside where we have less loss from mist than we have on the outside or on these small parts, then we would refine our cost down to individual parts. That is taking over one year's time on that line of work, and gives us an average for that class of work. Does that answer your question?

MR. SPERRY: Yes.

MR. VAN DERAU: I might say this in regard to that lacquer —that is a thing that depends entirely on the class of lacquer used. Now these bronze lacquers and clear lacquers, our first inclination was to indicate a cost for the clear coating and for the bronze. On the other hand, as we looked into the future, in the next couple years we couldn't see any articles coming through that were going to differ to any great degree from what we were already turning out. Now it would be foolish for us to go ahead and waste a lot of time and complicate the accounting system as well as giving more red tape in that particular section, so we simply took the average for that class of work.

Here is another point. All of those figures carry a 5% safety factor to take care of market conditions. For instance, as you know, nickel salts of 1929 are higher than 1928. Now, taken from the year of 1928, in which these costs were applied, we came out with a slight surplus, probably 6%. We added 5% on our cost ledgers to take care of that, so we came very, very close to the costs as they were established over the previous year. Now this year, I wouldn't be surprised to see a deficit in the accounts of 2% or 3% due to the rise in price of certain materials that have entered into it. Now if we recheck these figures each year, or each month, that would be a tremendous lot of work and wouldn't be worth the expense of it. But as against the percent method I will tell you that those accounts represented, without the vitrous enamelling account, a total of approximately $82,000, and when you have a $20,000 or $30,000 deficit in your method of accounting, that has got to be taken

care of. And if we can keep that within a few hundred or even a thousand dollars, our accounting section is perfectly well satisfied, and to anyone familiar with accounting methods in manufacturing plants there are a lot of things happen in the accounting department that we can't get by with in the shop.

MR. WILLIAMS: I would like to ask Mr. Van Derau in regard to the measurement of plated surfaces. For instance, a piece 12x12—do you count both sides or only one side, or the exposed sides?

MR. VAN DERAU: Both sides. For instance, if it is a toaster, it is finished on one side, white nickel one side and buffed nickel on the other. Now if it is a box, a heater box that goes under a hot plate, it is finished in white nickel, but it has approximately half a thousandth because it has to stand up against a certain amount of corrosion and it has at least got to stand in all kinds of warehouses before the customer gets it, so there is very little difference between the amount of nickel on that part and on the ring that is on top of it or the platform. So the area is figured on both sides. Now in pipe, that is only one side because you don't plate the inside of the pipe, only a very small amount at the ends. And wires—take wire goods for instance, that go inside of an oven. Those are figured, the surface. In other words, you would lay that thing out and take the square feet or the circumference of that wire, and there are a few little tricks in there, but they are mighty easy when you get down to it. When you take the whole line, you only have a half dozen of those items you have to rule on. It is a good deal like the cleaner solution. It was easy to take the list of materials, that is, nickel salts, boric acid, and nickel anodes, they all went in the nickel solutions; they didn't go into copper or cyanide solutions. There was no question where they belonged. But when we tried to figure out how much cleaner we used on nickel that was another problem and we scratched our heads a few days before this idea of taking the average condition in cleaning was approximately the same whether it was for nickel or for copper, and not a whole lot different if it was for chromium—a little better job and a little more thought given and more care given by the operator for chromium, but as far as the ingredients of the cleaner were concerned, there was very little difference. So we hit on the idea of percenting out. If we had 1,000,000 square feet total and 500,000 feet of it was nickel, then 50% belonged

to nickel, and so on down the line. That is the way that was taken care of.

MR. OSCAR SERVIS: Within what percent of accuracy do you suppose you have reached your conclusions?

MR. VAN DERAU: Within 1 per cent on 1928.

MR. SERVIS: Haven't you taken into consideration the electrical energy and overhead expense and all that?

MR. VAN DERAU: Don't get the department overhead conflicted with material costs. We carry that two ways. Now, for instance, on our flat labor, it is not a difficult job to take and find out how much power is being used in any section of the plant, and no two departments use the same amount of power. Let's see. In the iron finishing, for example, 485 horsepower is used. On the equipment that is on that floor. How many men are in it? About thirty or thirty-three men, I think was the man power of that section. Turning out around 40,000 irons per month. That varies. We put it on a daily basis, and it is 42,000 one month and 38,000 the next due to different working days in the month. In other words, to get an average per day. Now the overhead of that department is certainly greater than the assembly department where they may only have 10 horsepower on the whole floor, running a few riveting machines or something of that kind, or 20 horsepower, so that has been taken care of by the works engineering department, who have proportioned out the power used over the various departments, and each department carries its own overhead.

Now the supervision, the amount of inspection, production clerks, labor of that kind, indirect labor, goes into a direct overhead.

MR. SERVIS: Pardon me for a moment. You wouldn't include power energy in overhead; that would come in material costs.

MR. VAN DERAU: That would come in the general overhead; but the material costs are only the materials. In other words, here is what generally happens in materials. It is one of the reasons that many times an item can be an unprofitable line, yet it is not known. For instance, as I gave you an explanation there, a range leg. Today there are a good many companies coming around plants that are making ranges and they are trying to get back some of the business they used to have in the range industry in the way of black baking japans which they have lost

to vitrous enamels. I don't blame them a bit for doing that, but they are coming with lacquer enamels, some of them as low as $2.00 a gallon, and suggesting to the manufacturer of ranges that he use these baking color japans or lacquer japans by putting on a baking primer and putting one or two coats of a colored lacquer on top of such parts as switch covers and parts not subjected to heat, like the legs, so he will be able to cheapen his cost; and every manufacturer is out to cheapen his cost. Now here is what actually happens. We have had the same thing, and no doubt we would have fallen for that the same as a lot of others have, but we had just got through running this material cost, and we know it is going to take three coats of lacquer to give us a good job on a comparative vitrous enamel. But when we take the actual cost of lacquer and try to offset that against vitrous enamelling, it can't be done. Thirty cents as against 18c is the way it works out on one range leg. Now if we left the material out and proportioned that in a general overhead, all over the plant, then that would become a little bit on the assembly section, a little bit on the screw machine section, and so on, and we wouldn't know what our material costs were, and we could kid ourselves and say that this painted leg is much cheaper than the vitrous enamel, and as a matter of fact when you get down and take 100 or 1,000 of those legs and put them in lacquer and actually measure that amount of material, and take the same amount and put them in enamel and actually measure the difference, you will find that it lies in the fact that alcohols cost money and you only evaporate them in the air, and water is very, very cheap. And that is the real difference. Gallon for gallon, vitrous enamel against lacquer, it is within line. There may be 50c or 75c difference, but there isn't a lot of difference in the base cost of those materials to start with.

MR. KENNEDY: I was interested in what Mr. Van Derau said about the cost of electroplating. He and I worked for the same company in different parts of the country, but I think you will find that in his figures, the cadmium rate cost more per square foot than any of the other electrical deposits, and I have already taken that same thing up with our company in Springfield, to look into the cost of cadmium plating. About two years ago, we could buy cadmium anodes for about 60c a pound. Today, they are more than twice that. I have been told by men who seem to know, that the reason of the excess cost is not in the

supplying, but in the fact that some company has a stranglehold on the production of cadmium anodes and cadmium products generally. Now that being the case, he told me that the best thing to do would be for all the foreman platers to get in touch with their companies and try to see if the manufacturers couldn't talk to the company who has this stranglehold on cadmium and have them see it is only a few years before the manufacturers will begin to drop cadmium plating altogether on account of the excessive cost. I think Mr. Van Derau has had experience in cadmium plating and can bear out my words on the excess cost of cadmium as an electrical deposit.

MR. VAN DERAU: Those figures I gave you prove that it is a more expensive material cost. Now our company's standards again may influence that. For instance, we have a standard test which they are pretty fussy about putting on to every batch of work that comes through, whether it is in the barrel or testing out runs coming out of the tanks, of forty seconds of time for a stripping test, using muriatic acid, and antimony. I will give you a little illustration of what that meant. There was a company in our town which makes these outlet boxes for receptacle plates on the wall. And we buy a lot of those boxes from them, rather than make them ourselves, so that there was a very friendly relation between this company and ourselves. They got a certain amount of inquiries in new office buildings and things of that kind, buildings of that type, where the architect specified a rust resistant finish such as zinc or cadmium. They didn't want to go to the expense of putting in a plating department, hiring a man for the small production they would have. They didn't have a job plating plant within fifty or sixty miles of them; it meant quite a transportation problem, and they made arrangements with our company to do that work for them. So we figured it; we figured the job, and our standard practice in a case of that kind is to take labor, overhead, or labor and burden cost, the material; if it is on a percentage basis of 25 per cent, add that to the labor, and then add 15 per cent for profit and handling. As a matter of fact, that is standard practice between works. And we ran something like 115,000 or 120,000 of those boxes, and we put a rate on the job and we beat the estimate, and it actually on paper was showing a 25 per cent profit, and it made a nice job, it helped cut down the expenses of that particular plating department, and it fitted in with our own production very well and kept an average

man power employed. We got these figures out and we re-struck the thing on a square foot basis, and found we had lost something like $3,500 on it due to the material cost, and upshot of it is those boxes are no longer being cadmium plated; they are zinc plated because of the vast difference in the cost of the base metal, and, again, a metal that does not require high priced cyanide as against sulphuric acid and water. Now, there are a lot of those lines that you may run into when you get into this item of expense again. It runs out in a hundred directions, and the thing you are absolutely dead set on today, after you get a shock from the cost department and you buckle down to it, many times you will say, "I'll be darned if I believe I'm right on anything any more; I'm always wrong."

ELECTROPLATING SHEET COPPER

Read at Baltimore-Washington Branch Annual Meeting, January 25, 1930

I have been asked to speak on—"The Electroplating of Sheet Copper." As far as I know, no previous paper has been read on this subject. It is my plan to briefly discuss how the use of copper as a base metal would solve some of the present problems (as mentioned by Mr. McCord) as well as the actual electroplating of nickel, chromium, and tin.

We picture mass production or production on a large scale, as that of automobile parts, plumbing supplies, etc. Very little is known by the electroplaters of the history, development and rapid growth of electroplating in the Sheet Industry. It began with the thought that electroplating of nickel and finally chromium on a suitable base metal, would produce a durable and more beautiful finish at a much lower cost than it would to alloy them. This alloy though as durable, would not have near the beauty and would not maintain its lustre.

The public has not only accepted chromium, but is now demanding it. What housewife does not want chromium plumbing fixtures? The day of unsightly fixtures and utensils and hours of scouring and polishing is past. I do not think any man can but honestly and emphatically admit that chromium is the finest finish ever produced on an automobile. How many men who have

(Continued on page 35)

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(Continued on page 35)

A. E. S. PAGE

Assembled Expert Scraps With and Without Significance

'MEMBER BACK WHEN?

You put out a bucket of water for the iceman to wash off the sawdust before putting the ice in the box.

* * *

Our weekly allowance was a quarter, and we paid for our tablets and pencils from this sum, and even managed to save enough for an occasional gift to "Pa" and "Ma."

* * *

Bicycles were considered a menace to pedestrian safety and some towns provided bicycle paths, the users of which had license tags on their "wheels."

* * *

We men wore detachable cuffs, with cuff holders fastened to our shirts.

The Twentieth Century Girl

Blessings on thee, little dame,
Bareback girl, with knees the same;
With thy rolled down, silken hose,
And thy short, transparent clothes;
With thy red lips, redding—
With the lipstick from the store;
I wish you all the luck and joy,
Glad that I was born a boy.

—*R. Dick.*

Summary of Events in Trumbour Family

1913 — Thos. Trumbour, Capt. East Baseball Team.

1928 — Daughter Joan, flying over Detroit.

1930—A Grand-dad.

Not much more baseball, Tom.—*Editor.*

Street cars in small towns carried a mail box and the motorman would stop the car when any one wanted to mail a letter.

* * *

Ladies removed all hairpins from their hair during an electrical storm.

* * *

The whole family ate breakfast at the same time.

* * *

People ate all they wanted and never heard of dieting.

* * *

A Calamity

American (at Scottish football game): "Why don't they start? They ought to have kicked off an hour ago."

Scotchman: "Aye, something serious has happened."

American: "Not a player taken off ill?"

Scotchman: "No, worse than that, they canna find the penny they tossed up with."

—*Jos. Vilet.*

(Continued from page 33)
had good chromium plate on their automobiles, want to go back to finishes which require continued polishing?

We have in the Baltimore plant alone in the past five years, plated millions of square feet of nickel surface, not including in this figure the chromium, tin, etc., and we have had very few complaints on the plating or its durability.

Every sheet we produce must stand the most rigid tests. We plate in large sheets. After plating, the sheets are sheared, stamped and spun in the manufacture of reflectors, coffee urns, tubs for electric washing machines, etc. It can readily be seen that the plating must be right in order to stand all the crimping, stamping and forming into washing machine tubs, then give years of service filled with hot swirling alkali solutions and clothing.

Yet the automobile industry is condemning electroplating. I was surprised at the attitude of General Motors men and have since learned that a few others have criticized electroplating, while other industries have taken the reverse attitude.

While we electroplaters of the country are partly responsible for this existing condition, the greatest fault lies with the automobile industry itself. You would not build your factory on a poor foundation, neither should you electroplate on a poor base metal and expect a satisfactory result. We know that the slightest porosity in the plating will allow steel base metal to rust through or oxidize eventually causing complete destruction.

Most of the large automobile plants use steel as a base metal. This metal frequently breaks in the stamping, necessitating an army of men welding, patching and filing these defects, then using the various emery buffings to produce a suitable finish—finally, copper plating and buffing.

All these expensive operations would be unnecessary if the proper base metal were used. While brass produces a wonderful finish, the zinc oxidizes rapidly and gives trouble. Hair line cracks eventually appear in the plating and again the finish is undesirable.

Sheet copper being the most ductible metal, makes stamping and spinning a simple matter—all these welders, filers and emery buffers would be a thing of the past. It is only necessary then to polish the copper on a muslin or canvas wheel with tripoli and it is ready for nickel plating. You can see from this, that

you have only two or three operations, while before you had six or seven. The floor space, machinery and labor have been cut in half and copper plating has been eliminated.

We now have a radiator shell, or whatever we stamped and polished, with none of the faults of the base metals generally used and in addition, most any plater can do a first class job of plating that will last as long, if not longer, than the automobile itself, at a much lower cost.

The trouble is caused by the manufacturer using poor base metals and running his operating costs sky high, trying to get a satisfactory finish on them, then giving it inadequate coatings or jobbing it out to the lowest bidder, resulting in cut throat competition, there being no standard plating specifications for the work, the result being poor quality and a very unsatisfactory product. As a result, they condemn electroplating and consider the use of rustless or stainless steel and this is not the answer to their problem, it is merely starting over and going back to the beginning of alloyed metals.

We were one of the first copper producers to electroplate sheet copper. Our electroplate business has grown in the past five years by leaps and bounds. The first two years we were practically alone in this field—now most of our competitors are electroplating. Our rapid growth and development I attribute to just one policy, that is—quality. Our whole organization is trained on quality. Quality is the thing that is needed most in the electroplating field and every means you can install to produce it.

In the plating of sheet copper, we are starting out with a base metal that is not subject to atmospheric corrosion as is steel, aluminum, brass and other base metals. Therefore, the plating is only subject to abrasion or tarnish.

I will not go into detail regarding the uses of nickel plated copper. It is one of the oldest metals, and its uses are practically unlimited.

Preparatory to nickeling, the sheets are rolled and annealed, which is done to give the various grain sizes or crystalline structures and various strengths or tempers. They are then made flat on a hydraulic leveling machine and are now ready for the buffing department.

The sheets are buffed either on automatic or hand wheels of muslin with a peripheral speed of about 10,000 ft. per minute,

using tripoli composition. They are then inspected, those having defects in them are sent to what we term the rough buffs or canvass wheels where those defects are buffed out. They are then ready for the Nickel Plating Department. Arriving at the Nickel Plating Department the sheets are clamped or racked. They are then passed to the cleaning operation where they are cleaned electrolytically as a cathode at 4 to 5 amperes per sq. ft. for one to one and a half minutes in a mild alkali cleaner at about 150° F. It is only necessary in this operation to remove the greases used in buffing. They are then water rinsed and placed in the nickel bath—a standard, cold, single salt solution, ran at 70° F., using single nickel salts, ammonia chloride and boric acid. The sheets are left in the nickel solution at from 5 to 8 amps. per sq. ft. until a coating of 1½ to 2/10,000 thickness has been deposited. They are then rinsed and dried, sent to the resquaring shears where they are sheared to size, then to the buffing department for coloring.

I was asked to give some account of my troubles with nickel. The general opinion seems to be that trouble and electroplating are closely related, but it has been so long since I had any trouble, that I could best tell you how to avoid it.

To begin with, everything must be kept clean—all the contacts as well as the floors—keep your plating tanks clean and your solution clear—keep your tanks free of muck and sludge. When adding chemicals or sulphate to your nickel solution, make it up in some other container and then filter it into your regular plating solution.

Use the best or the purest anodes you can buy and keep enough chlorine in solution to maintain a standard metallic content, balancing this with an equal amount of boric acid, thereby making it unnecessary to continually add sulphate; when you add sulphate you also add impurities.

Neutralize your solution and precipitate impurities as often as is necessary, twice a year under average conditions, then bring it back to a P.H. of 5.8.

It is only necessary to follow a few simple rules to produce good nickel plating, such as—

Keep contacts, solution and anodes clean. A, P.H. of 5.8 as specified by the Bureau of Standards, should be maintained, as well as the standard metallic contest of about 30 G/L or 4 oz. per

gallon. The amount of chloride to carry in solution is governed by the type of anode in use. A cast 97 per cent anode corrodes more readily, so around 9 or 10 G/L of chloride should be sufficient. I prefer the 99 plus rolled, depolarized anode, which may require as much as 16 G/L of chloride in solution, using the same amount of boric acid.

There being no rapid or satisfactory method for the determination of boric acid in the solution, it is seldom taken, but the P.H. and the metallic content can easily be determined by the colormetric method, and the chlorine can be determined by titration. These titration and colormetric sets can be bought from most all plating supply houses.

Chromium Plating

I think this subject holds the greatest interest of the platers as nickel is an old subject that was mastered years ago by most of them. However, if you have not mastered cleaning and nickel plating, your faults will surely find you out in the chrome tank.

Most chrome plating is done over either nickel, copper or brass and I am thoroughly convinced from experience and observation, that chromium over nickel is by far the finest finish and the greater the lustre of the nickel, the greater the finish the chrome will have.

I will not discuss the various chromic acid concentrations, but will say that the sulphate ratio to chromic acid is very important and in my experience, find the 100 to 1 ratio gives best results.

I have plated and gotten good results in the bright range, with the various temperatures and current densities ranging from 90° F., 60 amps./sq. ft. and increasing the current density and temperature correspondingly to 130° F., 325 amperes per sq. ft., with the 400 gram solution. I also found that I could vary either the temperature or the current density by as much as five per cent as long as the ratio was from 95 to 1, or 100 to 1, but when the sulphate was a little low and showed a 107 to 1 ratio, the bright plating range became very narrow. If the current density were lowered slightly, brown spots would appear on the work where no chromium had deposited. Then if we raised the current a little, the deposit would be frosty on the edges.

If the sulphate is low, more sulphate can be added. If the sulphate is high, barium carbonate can be used—two ounces of barium carbonate will precipitate one ounce of sulphate.

I laid stress on keeping everything clean at the nickel tanks and

it is of greater importance to keep everything clean around the chrome tanks—chiefly contacts and anodes. I might say here that I prefer lead to steel for both anodes and tank lining—not pure lead, as it will go up in a short time, but antimony lead, and I prefer 6 per cent antimony rather than 3 per cent.

You will find that it is important to keep the lead anodes clean and free of lead chromate. This is a yellow substance which acts as an insulator.

I found if I had not used the tank for a day or so and I placed a dummy cathode in the tank and set a 6 volt, 5,000 ampere generator, at 6 volts, I could only get 4,000 amperes, but in a short time the ammeter would rise until it showed 6,500 amperes at 6 volts. This proves the necessity of good clean anodes and contacts.

We plate the chrome to any specified thickness, the average being a 2/100000 coating. I also found while plating at the various temperatures and current densities, while I have not tested it thoroughly, that the lowest range produced a somewhat softer deposit and correspondingly harder deposits as the temperature and current density was increased.

I have read a few articles where platers have controlled the current with the voltmeter. I cannot see how this can be done if you are plating material of various sizes requiring various current densities. I can plate most any article without either the voltmeter or the ammeter, by observing the action of the solution, but I don't recommend this method. I use a voltmeter on every tank and an ammeter on everything I plate. These instruments mean as much to me as a bible to a preacher.

Electrolytic Tin

Electrolytic tin is used in the manufacture of dairy equipment, coffee urns, condensers, wash boilers, etc. I doubt if this subject would be of much interest, as very few of the platers do any tin plating.

The solution we use is our own patented acid solution which is very costly to make and requires the porous cell method of obtaining metallic content. This would be out of the question for the average electroplater.

I recommend the alkali tinning solution and preferably the stannate solution as was thoroughly outlined by Mr. Proctor and published in the last April issue of the monthly review. You will get as good plating results from it. It is a less costly solution,

has cleaning properties which the acid does not have, and is easily controlled.

Tin plating requires strong cleaning solutions and preferably an acid dip before tinning, providing the work is not thoroughly buffed before plating. If, however, the work is buffed before plating, weaker cleaning solutions will give better results and the acid dip can be eliminated.

Contrary to the general opinion, defects in polished work before tinning show up again when the tin is polished, as does nickel and chromium. Better plating is obtained by using the lower current densities rather than the higher ones.

Tin shows a wonderful deposit much better than that produced by the molten method. Any thickness can be deposited, perfectly uniform.

We are also going to install a lead plating unit, but at the present time have only done experimenting on it.

W. S. Ermlich.

ROCHESTER BRANCH

NOTICE

Conference on Electroplating
at
Hotel Powers, Rochester, N. Y.
Saturday, March 22, 1930, at 9 a. m.

During the past three years the American Electroplaters' Society has maintained two research associates at the Bureau of Standards upon electro-plating problems. Their results were published in B. S. Research Paper 72 on "Spotting of Plated and Finished Metals," by W. P. Barrows, and B. S. Research Paper 131 on "Throwing Power in Chromium Plating," by H. L. Faber and W. Blum. These investigations have been supported by a research fund secured by subscription from manufacturers and from branches of the Electroplaters' Society.

The society is now engaged in obtaining subscriptions or renewals for another three years period in order to determine the extent of the demand of research on electroplating and the best means of conducting and supporting it. A conference will be held at the Hotel Powers, Rochester, N. Y., on Saturday, March 22, under the auspices of the Rochester Branch of the Electroplaters Society.

All persons who are engaged or interested in electroplating are invited to this conference.

The morning session will be devoted to a discussion of important Industrial Plating Problems and the steps being taken toward their solution. Authorities in their respective fields will represent industries engaged in the manufacture of automobiles, airplanes, plumbing fixtures, electrical goods, hardware, office and household equipment and silverware will be discussed. Mr. S. P. Gartland will preside at the morning session.

In the afternon session reports will be made upon plating researches in progress at the Bureau of Standards, universities and industrial laboratories.

There will be an opportunity to discuss the best way to obtain funds for research, conduct the investigations and make the results available and useful to the electroplaters and others interested in this field.

It is hoped that there will be a large and representative attendance. Those planning to come are requested to notify the undersigned so that the necessary arrangements may be made. Hotel arrangements may be secured if so desired. For list of speakers or any information write

CHARLES GRIFFIN, Secretary.

24 Garson Ave., Rochester, N. Y.

BRIDGEPORT BRANCH

Special Meeting

A meeting was held Friday, January 15, 1930, at New Haven, in Frederic B. Stevens, Inc., store-house, at 214 East St. The meeting was called to order by President Geo. Wagstaff. He then turned it over to the chairman of the Speaker Committee, Mr. Chamberlain. Mr. Chamberlain introduced the following speakers: Mr. L. R. Eastman, who spoke on buffing and polishing composition; Mr. A. H. Hanon, who spoke on automatic plating. Both speakers were given a rising vote of thanks. There was quite a gathering and it is hoped that we will hold future meetings in New Haven. After the meeting adjourned there were refreshments served.

Special Meeting, Friday, January 31, 1930

Meeting opened at 8 o'clock with President G. Wagstaff presiding. This meeting was called to get together a banquet committee. The following banquet committee was appointed by the president: Chairman R. J. O'Connor, J. C. Oberender, T. Chamberlain, Geo. Karl, Jo. Sexton, Wm. Stratton, Geo. Knecht and Art Sefarht. Chairman O'Connor explained to the society that this would be one of the best banquets that the branch ever had. Meeting adjourned at 10 o'clock.

Regular Meeting of February 7, 1930

Meeting opened with President Wagstaff presiding. The roll call of officers was read. All officers were present.

Two applications were read, they were Ernest Schavett, employed

at Fosberg Mfg. Co., and Howard Rice of the Apothecaries Hull Co.

Communications were read and approved.

Mr. O'Connor has given the use of his laboratory and he has an assistant that will instruct all the members in the branch how to analyze their solutions. A vote of thanks was extended to Mr. O'Connor. A committee was appointed to set aside a night and what solutions would be analyzed. The committee members are Fayette Runcarth, Wm. Flaherty and Wm. Thompson. Banquet committee reported progress. Meeting closed at 10:10 o'clock.

WM. EHRENCRONA, Secretary.

DETROIT BRANCH

Detroit Branch held its regular monthly meeting Friday evening, February 7, at the Statler Hotel, President B. F. Lewis presiding.

Due to the lengthy program the regular order of business was dispensed with. The meeting was then turned over to the chairman of the Educational Committee, Mr. Jameson, who introduced the speaker of the evening, Mr. Geo. B. Hogaboom, who conducted the question box, which was well received by the large gathering.

CHAS. M. PHILLIPS, Secretary-Treasurer.

THE REPORT OF THE 18TH ANNUAL BANQUET ST. LOUIS BRANCH

The afternoon session started about 3 p. m. and did not finish until about 6:30 p. m.

The paper read at this session by Mr. J. Hay of Detroit brought out some fine things on cleaning not only before chromium but cleaning before any kind of a plate. And there were a lot of questions asked and a lively discussion took place, all joining in.

Mr. Hay answered the questions very satisfactorily and then he had slides and he explained them so that every one could understand.

Dr. Stout of Washington U. was called and he gave a short talk on chromium and some of the tests he had made.

Mr. C. Procter was then called on to make a few remarks.

St. Louis had some out-of-town men who thought enough of St. Louis who flew from Detroit and Chicago in an airplane, and we sure appreciated their presence. There were about thirty men.

And then we had an old standby, Mr. E. Hiel, from Wichita, Kans., who said a few words and told us of a trip he had to Los Angeles, where he attended a meeting of Los Angeles Branch, A. E. S.

Mr. E. J. Musick was chairman of the banquet, and Mr. H. J. Richards was chairman of the afternoon session. Both handled it in fine style. Mr. Richards had his poem. Mr. J. Hay was given a rising vote of thanks.

CHAS. T. McGINLEY, Secretary.

BALTIMORE-WASHINGTON BRANCH

The above branch held its regular monthly meeting February 1, 1930, in the Enoch Pratt Library, Calhoun and Hollins St., Baltimore, Md., President M. J. Kraft presiding.

Dr. Blum opened the meeting, giving a review of our last lesson at the Bureau of Standards. Following this we proceeded with our regular business meeting. The roll call, minutes and communications were read and approved. Favorable reports were given from the banquet committees.

And now that the banquet is all over, we are all working hard to make the 1930 convention the best yet. Do not forget the date, June 30, July 1, 2, 3. Headquarters, the Mayflower Hotel, Washington, D. C.

Meeting closed 11 p. m. Sixteen members attended.

Hotel Committee—Mr. F. F. Pierdon, 622 Maryland Ave., Washington, D. C.

Entertainment Committee—Mr. T. F. Slattery, 13 E. Underwood St., Chevy Chase, Md.

Program Committee—Mr. I. H. Hahn, 708 Reistertown Road, Pikesville, Md.

Papers Committee—Dr. Blum, Bureau of Standards, Washington, D. C.

Registration Committee—Mr. A. D. Fewell, 3607 13th St. N. W., Washington, D. C.

Ladies Committee—Mrs. F. F. Pierdon, 622 Maryland Ave., Washington, D. C.

GEO. F. P. TURNER, Secretary-Treasurer.

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch, A. E. S., was held Saturday, February 8, 1930, at Hotel Atlantic.

Meeting was called to order with Pres. S. J. C. Trapp presiding and all officers present.

This was one of the good old fashioned meetings where the members came early, stayed late and the attendance was very good.

The Banquet Committee reported the banquet a success. The educational session was exceptionally good and was well attended.

The time usually allowed our instructor was taken up with branch business, so that part of the session was held over for our next meeting. However, he gave a short but good explanation of what the Ph. of a nickel plating sol. means, and for the benefit of the out-of-town members, Ph. means the Hydrogen ion concentration, or in other words the acidity of the nickel bath.

Out-of-town members, please sign your requests for information so I will know where to address them.

The librarian, Mr. O. E. Servis, then took charge and the following questions were found in the box:

Ques. No. 1—What causes a silver sol. not to deposit where there are small pore holes?

Ans. No. 1—Improper cleaning.

Ques. No. 2—What is a good brightener for a cyanide copper sol. so as to require no buffing?

Ans. No. 2—Carbonate of lead dissolved in caustic soda, add about 1/64 oz. per gal. Sol. must be agitated.

Ques. No. 3—Where is preferable as an anode in a cleaning sol., the tank or special anodes?

Ans. No. 3—The special anode is preferred if a rheostat is not obtainable. It will work very good either way.

Ques. No. 4—Is it possible to get a bright deposit with a bronze sol.?

Ans. No. 4—It was suggested to try the cyanides of the following metals: tin, arsenic or nickel.

Ques. No. 5—What causes a brass sol. to show reddish spots on the end of the articles. It plates nice yellow color, shows a reddish tinge when taken out.

Ans. No. 5—Do not let work hang in tank after the current is shut off was one suggestion. Too much caustic soda, ammonia or zinc was another.

Ques. No. 6—What Ph. should a nickel sol. be kept prior to chrome plating?

Ans. No. 6—Ph. is of about 5.8 to 6.0.

J. C. KRETSCHMER, Secretary.

January 18, 1930.

The eighteenth annual educational meeting of the Chicago Branch of the American Electroplaters Society was held in the club rooms of the Palmer House in Chicago, Ill., on the above date.

At 2 p. m. the librarian, Oscar E. Servis, called the meeting to order and introduced our branch president, Samuel J. C. Trapp. President Trapp welcomed our members and friends, who had gathered about 300 strong, with a few well-chosen and sincere words of greeting.

Owing to the many details devolving upon our branch secretary, J. C. Kretschmer, in connection with the dinner dance to follow the educational meeting, he was excused and H. W. Faint asked to serve as secretary pro tempore.

The first paper presented was on "Contamination of Chrome Solutions," by Cyril Kocour. In Mr. Kocour's absence the paper was read by Mr. Porter.

Mr. D. H. Simpson read a paper on "Standards."

"A Panoramic View of the Plating Situation" was the next paper, read by Mr. Jacob Hay. Slides illustrating the points made by the speaker accompanied the reading.

Our next speaker, Mr. Milford H. Corbin, both discussed "Deposition of Rubber and Non-Metallic Substances" and gave a practical Demonstration of Electro-Deposition of Rubber, Asphalt and Lacquer on Strips of Zinc Metal.

Discussion following Mr. Corbin's paper brought out the interesting possibilities of using this process in practical ways.

"Old Timer," revealed as J. H. Hansjosten, read an entertaining

paper on the contrast of the old-time plating room with modern methods of production work. The title of his paper was "A Review of the Past and the Present."

Some suggestions on the ever-present "Pitting of Nickel Solutions" were read by E. P. Romanoff.

Then came the founder of our society, Charles H. Proctor, with a paper, "Doing Things for the Electro-Plating Industry." Mr. Proctor had some samples of new zinc, tin and cadmium alloy deposits to show the application of these new alloys in specific industries.

Before announcing our last speaker, Librarian Servis called our attention to the annual Milwaukee branch meeting, to be held in Milwaukee on April 26, 1930.

Dr. William Blum was able to cram an intensive lot of information into a few minutes' summary of the work just completed at the Bureau of Standards on "Throwing Power of Chrome Baths." A resume of his remarks, as compiled by your secretary pro tempore is attached. Dr. Blum said that the details of the investigation of "Throwing Power of Chrome Baths" are now in the hands of the printer and will be available and mailed to all our members in a very short time.

The meeting was adjourned at 6:05 p. m.

Resume of remarks by Dr. William Blum, U. S. Bureau of Standards, on "Throwing Power in Chrome Baths."

Given before Chicago Branch, A. E. S., on January 18, 1930.

At best, the throwing power of a chrome bath is poor. However, there are four ways in which racking may assist in getting better current distribution, hence apparently increasing throwing power.

1. By having anode parallel to and within say a half inch of the cathode surface.

2. By having cathode far removed from anode, so that there is less danger of "burning" on edges that otherwise would be quite close to the anode.

3. By using an auxiliary cathode wire to deflect some current from the work that is being plated.

4. By turning pointed parts toward the insulation on the tank or partially covering such pointed parts with glass or similar insulators.

The factors of temperature, current density, strength of chromic acid, amounts of trivalent chromium, ratio of chromic acid to sulphuric acid, all have some bearing on throwing power. Details of their effect are noted in a pamphlet now in the printer's hands, and soon to be available to all members of the society.

The "bent-cathode" test for throwing power was used as a basis for comparative indications of throwing power where first one and then another factor was altered. Cards, holding mountings of various bent cathode tests were then passed around so that members present could see what a wide range of results are obtained.

Much interest was manifested in these bent cathode tests, which Dr. Blum passed around.

H. W. FAINT.

HARTFORD-CONNECTICUT VALLEY BRANCH

The Hartford-Connecticut Valley Branch, A. E. S., held its regular monthly meeting at the Hartford Chamber of Commerce, 805 Main St., Hartford, Conn., Monday evening, January 27, 1930.

The meeting was called to order at 8:30 p. m. with President Beloin in the chair. Minutes of the previous meeting were read and approved. Several communications were read and placed on file. No bills were presented. Two applications were received and voted on for publication.

Mr. E. R. MacNickoll, chemist for the International Silver Co., of Meriden, Conn., was then introduced and gave a very interesting talk on "Silver Plating with an Automatic Plating Machine."

His talk was very interesting and caused much discussion among the members. In conclusion he was given a rising vote of thanks.

The meeting was attended by twenty-four members and visitors, and was adjourned at 10:30 p. m.

VERNON E. GRANT, Secretary.

PHILADELPHIA BRANCH

The Philadelphia Branch held its regular monthly meeting February 7, with Vice-President S. T. Lunbeck in the chair, with an attendance of 46 members present, among whom were Supreme President Mr. Horace Smith and Mr. Oliver Sizelove of Newark Branch. Both were heartily welcomed and President Smith, in his acknowledgment of the welcome, expressed his sympathy in the loss of our presiding officer, Mr. W. M. Scott, and dwelt on the research problems and the meeting of the Research Committee in Rochester.

Mr. Sizelove spoke of the chemistry class of Newark Branch and told of the interest the members have taken to know the solutions, and was pleased to hear of the spirit the Philadelphia members are putting forward in their classes.

This being a Question Box meeting, Mr. O. W. Mott took charge of the questions and handled them in an able manner. As there were some interesting questions asked, all present entered into the discussions and kept the members together until a late hour.

PHILIP M. UHL, Secy. & Treas.

BRIDGEPORT BRANCH

The Bridgeport Branch of the A. E. S. are holding a banquet March 8, 1930, at the Stratford Hotel in Bridgeport.

There will be an educational session in the afternoon, which will be followed by the banquet at 7 p. m. Eastern standard time.

The men on the committee in charge of the banquet are as follows: Mr. O'Connor, chairman, Mr. Karl, Mr. Oberender, Mr. Stratton, Mr. Thompson, Mr. Sexton, Mr. Knecht, Mr. Chamberlain, Mr. Sefarht.

All A. E. S. members and friends are invited to attend.

WM. EHRENCRONA, Secretary.

CLEVELAND BRANCH

On January 18 the Cleveland Branch had a smoker which was the biggest success in every way that this branch has ever had anything to do with and I dare say that everyone present had a good time.

At our regular meeting Mr. Cyrex read a paper on cadmium plating which our president had brought down, and this contained a wealth of information for those that do cadmium plating, and we had a very lively discussion.

At our next meeting Mr. K. Pitschner, chief chemist of the Firestone Steel Products Co., is going to demonstrate a P. H. determinator of the radio type that he has invented and we hope the boys will turn out in numbers sufficient to warrant a man such as Mr. Pitschner coming to Cleveland for a demonstration.

H. J. TERDOEST, Secretary.

BOSTON BRANCH

The regular monthly meeting of the Boston Branch of the American Electro-Platers' Society was held at the American House, Boston, February 6th, 1930.

The meeting was called to order at 8:30 by President Gale. He told of the future meetings which were being arranged with the best possible speakers, to which all interested persons are free to attend. The only thing that the branch asks in return is the membership of all eligible persons so that this and other constructive work may be carried on. The speaker of the evening, Dr. Floyd Taylor of the Hanson-Van Winkle-Munning Company, was then introduced.

Dr. Taylor's subject was "The Tank Rheostat." As the speaker himself expressed it, "if more platers understood the limitations of the tank rheostat, fewer would expect miracles and more would be able to use it to better advantage." After Dr. Taylor finished his discussion of the rheostat, Ohms law, and experiences relating to these subjects the truth of his statement was evident.

A rising vote of thanks was extended to Dr. Taylor for his kindness and the meeting was adjourned at 10:30 p. m.

THOS. JOHNSON, Rec. Sec.

APPLICATIONS

	Branch
Joseph Bedo, 6110 Cedar Ave., Cleveland, Ohio	Cleveland
Harold F. Ream, Crown Pl., Matawan, N. J.	New York
John J. Knadel, 19 Tower Hill Ave., Red Bank, N. J.	New York
Albert E. Nicoll, care Walker & Hall, Ltd., Sheffield, Eng.	New York
Harry Carlin, 2201 Haviland Ave., New York, N. Y.	New York
Frank Miltner, Lindenhurst, Long Island, N. Y.	New York
Samuel Goldstein, 445 E. 174th St., New York, N. Y.	New York

Basel H. Green, 4 Doubleday St., Binghamton, N. Y.....New York
Samuel Garden, 2822 E. 7th St., Brighton Beach, Brooklyn, N. Y. .....New York
C. T. Young, care Bronson Reel Co., Bronson, Mich.....Chicago
Geo. J. McKenna, 1025 N. Mason Ave., Chicago, Ill.....Chicago
Henry F. Droeger, 4939 N. Hamlin Ave., Chicago, Ill.....Chicago
Frank J. Babersky, 2433 S. Grove Ave., Berwyn, Ill.....Chicago
Edward Steppa, 1541 S. 59th Ct., Cicero, Ill.....Chicago
C. R. Kelley, 601 Garfield Ave., Elkhart, Ill.....Chicago
Jos. Manshard, 808 Goodwin St., Peoria, Ill.....Chicago
Wm. Branchwood, 59 Arthurle St., Banhead, Scotland....Philadelphia
Paul Hilbert, 606 E. Phila. Ave., Boyertown, Pa.....Philadelphia
Carrol L. Etchison, care Everyready Co., Frederick, Md....Philadelphia
J. S. Patterson, 989 Carber St., Philadelphia, Pa.....Philadelphia
C. M. Moore, 1326 Elm St., Lebanon, Pa.....Philadelphia

ELECTIONS Branch

C. W. Estes, 5111 5th St. N. W., Washington, D. C.....Balti.-Wash.
Wm. Glomski, 2427 Coyne St., Chicago, Ill.....Chicago
Chas. P. Walter, 2325 5th Ave., Moline Ill.....Chicago
Albert L. Slater, 906 Wilson Ave., Webster City, Ia.....Chicago
T. J. O'Connor, 2629 Bealy St., W. Philadelphia, Pa.....Philadelphia
C. W. Fosburg, 336 Melrose St., Sharon Hill, Pa.....Philadelphia
W. Williams, care Esterbrooke Steel Pen Co., Camden, N.J..Philadelphia
Stanley Moore, 1153 W. Woodruff Ave., Toledo, Ohio.....Toledo
A. G. Spindler, 12 N. Baker St., Evanvsille, Ind.....St. Louis
Benj. A. Smith, 3629 Iowa Ave., St. Louis, Mo.....St. Louis
E. A. Williams, 1935 Warren Ave., Detroit, Mich.....Detroit
Chas. C. Duvall, 507 Oakley St., Evansville, Ind.....St. Louis
S. C. Cole, care Howard L. Meyers, Toledo, Ohio.....Toledo
A. D. Gaskin, care Bruce Products Co., Howell, Mich.....Detroit
M. G. Scholar, 1253 La Palmas Ave., Los Angeles, Cal....Los Angeles
R. R. Wilde, 137 W. 15th St., Los Angeles, Cal.....Los Angeles
W. H. Whitman, 3429 Pasadena Ave., Los Angeles, Cal...Los Angeles
F. J. McGready, care Auburn Auto Co., Connersville, Ind.....Dayton

RESIGNED Branch

C. S. Weygrandt, 318 S. 2nd St., Belleville, Ill.....St. Louis
M. H. Robinson, 392 Brock Ave., Toronto, Can.....Toronto

RESINSTATEMENTS Branch

H. Leroy Bearer, 7106 Wayne Ave., Bynwood Upper Darby, Pa. .....Philadelphia

DEATHS Branch

Leonard Lesch .....New York

TRANSFERS Branch

Emil Troxler, from Cleveland to.....New York
H. L. Farber, from Baltimore-Washington to.....Dayton

SUSPENSIONS Branch

E. W. Beightol, 245 Shepard Ave., Kenmore, N. Y.....Rochester